

appended claims. All publication and references cited herein are expressly incorporated herein by reference in their entirety.

What is claimed is:

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1. A suture welding system for fixedly attaching a first length of suture to a second length of suture at a suture welding site, comprising:

an electrosurgical energy source; and

5 a suture welding device, having:

a working end;

a suture contacting element disposed on the working end;

a first electrode electrically coupled to the electrosurgical energy source and disposed on the suture contacting element for providing electrical energy to the first and

10 second lengths of suture; and

a second electrode electrically coupled to the electrosurgical energy source and disposable proximate to the suture welding site for providing a return electrical energy path to the electrosurgical energy source;

15 wherein provision of electrical energy by the first electrode to the first and second lengths of suture welds the first and second lengths of suture into a fixed attachment.

2. The system according to claim 1 wherein the electrosurgical energy source generates radio frequency waves.

20 3. The system according to claim 1 wherein the suture contacting element comprises two opposing faces having a variable gap therebetween, each face having an electrode disposed thereon.

25 4. The system according to claim 3 wherein the suture welding device is configured to be selectively adjustable between an open position and a closed position, wherein the first and second lengths of suture may be placed within the variable gap in the open position and wherein the lengths of suture are constrained within the variable gap in the closed position.

30 5. The system according to claim 1 wherein the first and second lengths of suture are made of material selected from the group consisting of polydioxanone, prolene, and polymer plastics.

6. The system according to claim 1 wherein the first and second lengths of suture are made of polydioxanone.

7. The system according to claim 1 wherein a weldable material is provided between at least one electrode and at least one length of suture, the weldable material adapted to weld the first length of suture thread to the second length of suture thread upon application of electrical energy through the at least one electrode.

8. The system according to claim 1 wherein the suture welding device includes a piston slidably engaging the suture welding device so as to be translatable in a longitudinal direction to encourage contact between the first and second lengths of suture and at least one electrode.

9. A suture welding system for fixedly attaching a first length of suture to a second length of suture at a suture welding site within a patient, comprising:

an electrosurgical energy source; and

a suture welding device, having:

a proximal handle;

a distal end;

a suture grasper disposed on the distal end for holding first and second lengths of suture, the suture grasper including first and second suture grasping members, at least one suture grasping member being moveable with respect to the other suture grasping member;

an actuator disposed on the proximal handle and coupled to the suture grasper for selectively moving the suture grasper between a first, open grasper position wherein the first and second suture grasping members are spaced apart to allow first and second lengths of suture to be placed within the suture grasper and a second, closed grasper position wherein the first and second suture grasping members are spaced so as to hold the first and second lengths of suture within the suture grasper; and

first and second electrodes electrically coupled to the electrosurgical energy source and disposed on the suture grasper for providing electrical energy to the first and second lengths of suture;

wherein provision of electrical energy by the electrodes to a first and second lengths of suture welds the first and second lengths of suture into a fixed attachment.

10. The system according to claim 9 wherein the electrosurgical energy source generates radio frequency waves.

5 11. The system according to claim 10 wherein the radio frequency waves have a frequency of between about 100KHz and 1MHz.

12. The system according to claim 9 wherein at least one suture grasping member slidingly engages the other suture grasping member to result in relative movement essentially
10 along a longitudinal axis of the suture welding device to open and close the suture grasper.

13. The system according to claim 9 wherein at least one suture grasping member pivotally engages the other suture grasping member so that a gap between the suture grasping members decreases in a direction substantially orthogonal to a longitudinal axis defined by
15 the suture welding device when the suture grasper is selectively moved from the first, open grasper position to the second, closed grasper position.

14. The system according to claim 9 wherein a weldable material is provided between at least one electrode and at least one length of suture, the weldable material adapted to weld the
20 first length of suture thread to the second length of suture thread upon application of electrical energy through the at least one electrode.

15. The system according to claim 9 wherein the suture welding device includes a piston slidingly engaging the suture welding device so as to be translatable in a longitudinal
25 direction to encourage contact between the first and second lengths of suture and at least one electrode.

16. The system according to claim 9 wherein the first and second lengths of suture are made of material selected from polydioxanone, prolene, and polymer plastics.

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17. The system according to claim 9 wherein the first and second lengths of suture are made of polydioxanone.

18. The system according to claim 9 wherein the suture welding device includes a temperature sensor disposed proximate to at least one electrode, the electrosurgical energy source communicating with the temperature sensor and stopping the delivery of energy based on the temperature sensed.

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19. The system according to claim 9 wherein the electrosurgical energy source includes a timer and stops the delivery of energy to the electrodes after the energy has been supplied for a predetermined amount of time.

10 20. A method for welding a first length of suture to a second length of suture to create a fixed attachment therebetween, comprising:

- (a) providing an electrosurgical energy source;
- (b) providing a suture welding device, having:

a working end;

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a suture contacting element disposed on the working end;

a first electrode electrically coupled to the electrosurgical energy source and disposed on the suture contacting element for providing electrical energy to the first and second lengths of suture; and

a second electrode electrically coupled to the electrosurgical energy source

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and disposable proximate to the suture welding site for providing a return electrical energy path to the electrosurgical energy source;

(c) placing a first length of suture and a second length of suture into contact with the suture contacting element; and

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(d) providing electrical energy from the electrosurgical energy source through the first electrode to the first and second lengths of suture to weld the first length of suture to the second length of suture to create a fixed attachment therebetween.